CLAIMS

Claims 1 – 22 (cancelled)

Claim 23 (New) A recombinant pox virus comprising a nucleic acid sequence encoding an immunogenic MUC1 fragment comprising approximately 5 to *25* MUC1 tandem repeat units, wherein said nucleic acid sequence is altered from the native tandem repeat pattern by using alternative codons to reduce homology between the repeats.

Claim 24 (New) The recombinant pox virus of claim 1, wherein the immunogenic MUC1 fragment comprises approximately 7 to 15 MUC1 tandem repeat units.

Claim 25 (New) The recombinant pox virus of claim 2, wherein the immunogenic MUC1 fragment comprises 10 MUC1 tandem repeat units.

Claim 26 (New) The recombinant pox virus of claim 1, wherein the pox virus is selected from the group consisting of orthopox, suipox and avipox.

Claim 27 (New) A pharmaceutical composition comprising:

(a) a recombinant pox virus comprising a nucleic acid sequence encoding an immunogenic MUC1 fragment comprising approximately 5 to 25 MUC1 tandem repeat units, wherein said nucleic acid sequence is altered from the native tandem repeat pattern by using alternative codons to reduce homology between the repeats, and an immunomodulator.

Claim 28 (New) The pharmaceutical composition of claim 5, wherein the immunomodulator is selected from the group consisting of T-cell co-stimulatory factors and cytokines.

Claim 29 (New) The pharmaceutical composition of claim 6, wherein the cytokine is an interleukin.

Claim 30 (New) The pharmaceutical composition of claim 5, wherein the immunomodulator is both a T-cell co-stimulatory factor and a cytokine.

Claim 31 (New) The recombinant pox virus of claim 5, wherein the pox virus is selected from the group consisting of orthopox, suipox and avipox.

Claim 32 (New) The pharmaceutical composition of claim 5, wherein the immunomodulator is encoded by a nucleic acid sequence on a separate pox virus from said recombinant pox virus comprising the nucleic acid sequence encoding said immunogenic MUC1 fragment.

Claim 33 (New) The pharmaceutical composition of claim 5, wherein the immunomodulator and the immunogenic MUC fragment are both encoded by nucleic acid sequences located on a single pox virus.

Claim 34 (New) The pharmaceutical composition of claim 5, wherein said MUC1 fragment comprises about 7 to 15 tandem repeat units.

Claim 35 (New) A method of generating an immune response in a mammal having a MUC1-expressing tumor comprising:

(a) administering to the mammal the pox virus of claim 1; and

(b) administering a second amount of pox virus wherein the pox virus is selected from the group consisting of orthopox, suipox and avipox.

Claim 36 (New) The method of claim 13 wherein said boosting is administered by using an effective amount of second recombinant pox virus from a different viral genus from said pox virus of claim 1.

Claim 37 (New) The method of claim 13, wherein said mammal is further administered an immunomodulator.

Claim 38 (New) The recombinant pox virus of claim 1 which is rV-MUC1.

Claim 39 (New) The method of claim 13 wherein the boosting comprises an effective amount of MUC1 administered as a MUC1 peptide or as a nucleic acid sequence that encodes said MUC peptide.

Claim 40 (New) A method of inhibiting or killing MUC1 positive tumor cells comprising:

(a) generating MUC1 specific cytotoxic T-lymphocytes (CTLs) by stimulating harvested lymphocytes in vitro by adding an effective amount of a MUC1 specific antigen to the lymphocytes, alone or in combination with one or more cytokines, to generate said CTLs; and

(b) administering the CTLs alone or in combination with a immunomodulator into a mammal in an amount sufficient to inhibit or kill the MUC1 positive tumor cells.

Claim 41 (New) A method for generating an immune response in a mammal that contains a MUC1-expressing tumor comprising administering to said mammal at least one pox virus of claim 4.